Chapter 4.

Summary of the Results of Wildlife Monitoring (Fiscal Year 1995)

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1. Purpose of the survey

The purpose of the survey is to grasp the environmental pollution by chemical substances on a yearly basis by way of conducting regular and systematic survey of the pollution level for wildlife by chemical substances (mainly Class 1 Specified Chemical Substances) which are thought to be harmful to human health and the environment.

2. Surveyed areas

Surveyed areas were selected where the pollution level in specific areas (around urban cities and industrial areas) and around the Japanese Archipelagos could be grasped comprehensively on long time basis.

The surveyed areas in the fiscal year 1995 survey, were 18 areas from the sea, 1 from fresh water, and 2 land areas, a total of 21 areas.

Figure 4-1 shows the surveyed areas and the name of the wildlife collected for survey.

3. Surveyed wildlife

The kinds of surveyed wildlife were selected for their significance and usefulness as a sample, together with the consideration for international comparison. A total of 12 kinds (mainly seabass and common mussel) were selected in fiscal year 1995; 8 fishes, 2 shellfishes and 2 birds.

The characteristics of each kind of wildlife chosen for the survey are listed in Table 4-1.

5 samples were prepared from fishes, shellfishes and birds obtained from each surveyed area. In this case, when one body was not enough for the necessary quantity of a sample (for example, common mussel) more than one body were used for a sample.

Concerning each sample, the following parts of the body were taken and used as samples for analysis.

- fish: muscles
- shellfish: shucked shellfish
- bird: pectoralis muscle

4. Surveyed chemical substances

The survey was conducted mainly concerning Class 1 Specified Chemical Substances.

Taking into consideration past survey results, those chemical substances which had no difference in the detected level, or were almost not detected at all need not be surveyed every year. They have been the subject of the survey with appropriate intervals of time.

At present, 20 substances excluding organotin compounds as shown in Table 4-2 are subject to the monitoring survey.

Chlorinated organic compounds were analyzed using GC/ECD and organotin compounds were analyzed using GC/ECD or GC/FPD. However, when it could not be distinguished with other components, quantitative and qualitative analysis were conducted using GC/MS.

5. Survey results

Survey results in fiscal year 1995 are as follows for each surveyed substance except for organotin compounds which are shown in Chapter 6. (ppm indicates ㎎/g·wet)

(1) PCB and similar substances (PCB and HCB)

① PCB and HCB were designated as Class 1 Specified Chemical Substances based on the Chemical Substances Control Law in June, 1974, and August, 1979, respectively, since they were not easily biodegradable etc.. It is thus important from many aspects to follow their concentration levels in the environment. In this survey, PCB and HCB were selected as substances subject to the survey since fiscal year 1978, and monitoring has been conducted.

② PCB was detected in fishes, shellfishes and birds. HCB was detected in fishes and birds. The survey results for PCB and HCB are indicated in Appendix E.

③ PCB has not been released in the environment after its general use was prohibited in fiscal year 1972, but is still being detected in a total of 13 areas. The survey area was increased compared to the fiscal year 1994 survey. The survey results in fiscal year 1995 indicate that PCB still persists in wide area of the environment. Expansion of pollution by the 2 substances PCB and HCB is not generally expected, since they have been prohibited from actual manufacture or use and PCB has been designated as a Specially Controlled Industrial Waste based on the Law Concerning the Disposal and Cleaning of Industrial Waste in July, 1992. But it is important to grasp the transition of pollution by these substances. It remains necessary to continue their monitoring and their chemical fate in environment should be followed, to obtain useful information for studying the transition of other substances in the environment. However, the detected frequencies for HCB are decreasing in recent years, so it seems to be possible to follow the chmical fate in environment in surveys after a certain period of time.

(2) Drins (Dieldrin)

① Dieldrin is a kind of pesticides of the drins. The use of drins as agricultural chemicals is said to have been at its peak in 1955-1965, but its manufacture and use were prohibited since 1971, but dieldrin had been used as an antitermite agent. However, in October, 1981,

it was designated as a Class 1 Specified Chemical Substance based on the Chemical Substances Control Law, so that its use was totally prohibited together with the regulation as an agricultural chemical. In this survey, it was selected as the substance subject to the survey since fiscal year 1978, and monitoring has been conducted.

② Dieldrin was detected in fishes, and shellfishes and birds. The survey results for dieldrin are indicated in Appendix E.

③ Dieldrin was detected in 6 areas, similar to the results of the fiscal year 1994 survey. Thus it remains necessary to continure its monitoring, but the detected frequencies have shown a tendency to decrease in recent years, so it seems to be possible to grasp its tendency in surveys after a certain period of time in principle.

(3) DDTs and their derivatives

① DDT is a kind of pesticides which was popularly used together with HCH and Drins. Its use as an agricultural chemical has been prohibited since 1971. In October, 1981, it was designated as a Class 1 Specified Chemical Substance together with the drins. DDT has several isomers based on the location of chlorine of the benzene ring. In this survey, p,p'-DDT which is an active component of DDT, o,p'-DDT, and the 4 kinds of derivatives, o,p'-DDD, p,p'-DDD, o,p'-DDE and p,p'-DDE which are the degradation products of DDT in the environment, were selected as substances subject to the survey since fiscal year 1978, and monitoring has been conducted.

② Comparing the detected frequencies for each isomer p,p' and o,p' of DDT, DDE and DDD, values for p,p' isomer were higher in general. This may be related to the fact that the proportional quantity of p,p' isomer is large among the industrial products of DDT (70-80% of p,p', and 20-30% of o,p'). Concerning p,p' substances which had high detected frequencies, p,p'-DDT, p,p'-DDE and p,p'-DDD were detected in fishes, shellfishes and birds. The survey results for p,p'-DDT are indicated in Appendix E.

③ There has been no great change in the detection range for each isomer and derivatives. But p,p'-DDE was detected in birds with high concentration levels in comparison to detected values of conserning other DDTs as was the case in the past. The detected frequencies in shellfishes for p,p'-DDT doubled the result in fiscal year 1994. Since DDTs persist widely in the environment although at low concentration levels, it remains necessary to continue their monitoring hereafter. However, the detected frequencies for o,p'-isomers are decreasing in recent years, so it seems to be possible to grasp their chemical fate in environment in surveys after a certain period of time in principle.

(4) Chlordanes

① As a result of the Detailed Environmental Survey conducted in fiscal year 1982, chlordanes were detected widely in the environment in bottom sediments and fishes, so that it was added to the substances subject to the survey since fiscal year 1983. In Japan, it has been used for antitermite agents, lumber (primary processing), and plywood, but since it is not easily biodegradable, it was designated as a Class 1 Specified Chemical Substance based on the Chemical Substances Control Law in September, 1986. The compositions of chlordanes manufactured for industrial purposes are complicated, but in this survey, the 5 chlordanes which had high detection frequencies in the results of the fiscal year 1982 Detailed Environmental Survey conducted concerning 8 chlordanes, were selected as substances subject to the survey.

② Trans-and cis-chlordane were detected fishes and shellfishes, and the other 3 chlordanes were detected in fishes, shellfishes and birds. The survey results for these substances are indicated in Appendix E.

③ Since chlordanes are not easily biodegradable and have been used in large quantities and have high detected frequency, it remains necessary to continue to carefully follow their persistence in the environment hereafter.

(5) HCHs (α-HCH, β-HCH and γ-HCH)

① HCHs had been used as agricultural chemicals in the past, but their use has been prohibited since 1971. There are many isomers of HCHs, but in this survey, 4 isomers, α, β, γ, and δ, were selected as substances subject to the survey, and monitoring has been conducted since fiscal year 1978. Monitoring was conducted for the 3 isomers, α, β and γ, in fiscal year 1995.

② α-HCH and β-HCH were detected in fishes and birds, and γ-HCH was not detected only in any of the wildlife. The survey results for α-HCH are indicated in Appendix E.

③ HCH isomers except γ isomer are said to have high persistence, and it should be meaningful to monitor and confirm their persistence in the environment from the point of view of worldwide pollution monitoring. But since the detected frequencies of HCHs have shown a tendency to decrease in recent years, it seems to be possible to grasp their chemical fate in environment in surveys after a certain period of time in principle.

(6) Phthalates and Phosphates

① Among the phthalates and phosphates which were used widely as plasticizers for plastics, di-n-butyl phthalate, bis(2-ethylhexyl) phthalate (phthalates) and tributyl phosphate (phosphates) were selected as substances subject to the survey, and monitoring has been conducted since fiscal year 1980. These substances were detected with substantially high detected frequencies in the fiscal year 1974-1977 environmental surveys etc. and were detected with high detected frequencies in water and bottom sediments in recent environmental surveys. However, the detected frequencies are decreasing in the several recent surveys, so phthalates have been surveyed every other year, and tributyl phosphate was surveyed for the first time since fiscal year 1991.

② The 3 substances were only detected in shellfishes.

③ Since phthalates and phosphates are used widely, it will be meaningful to continue their monitorings all over Japan to grasp their chemical fate in environment. But due to the recent tendency of low detected frequencies, it seems to be possible to grasp their chemical fate in environment in surveys after a certain period of time as was the case in the past.

Fig. 4-1 Surveyed Areas and Species for Wildlife Monitoring (Fiscal Year 1995)

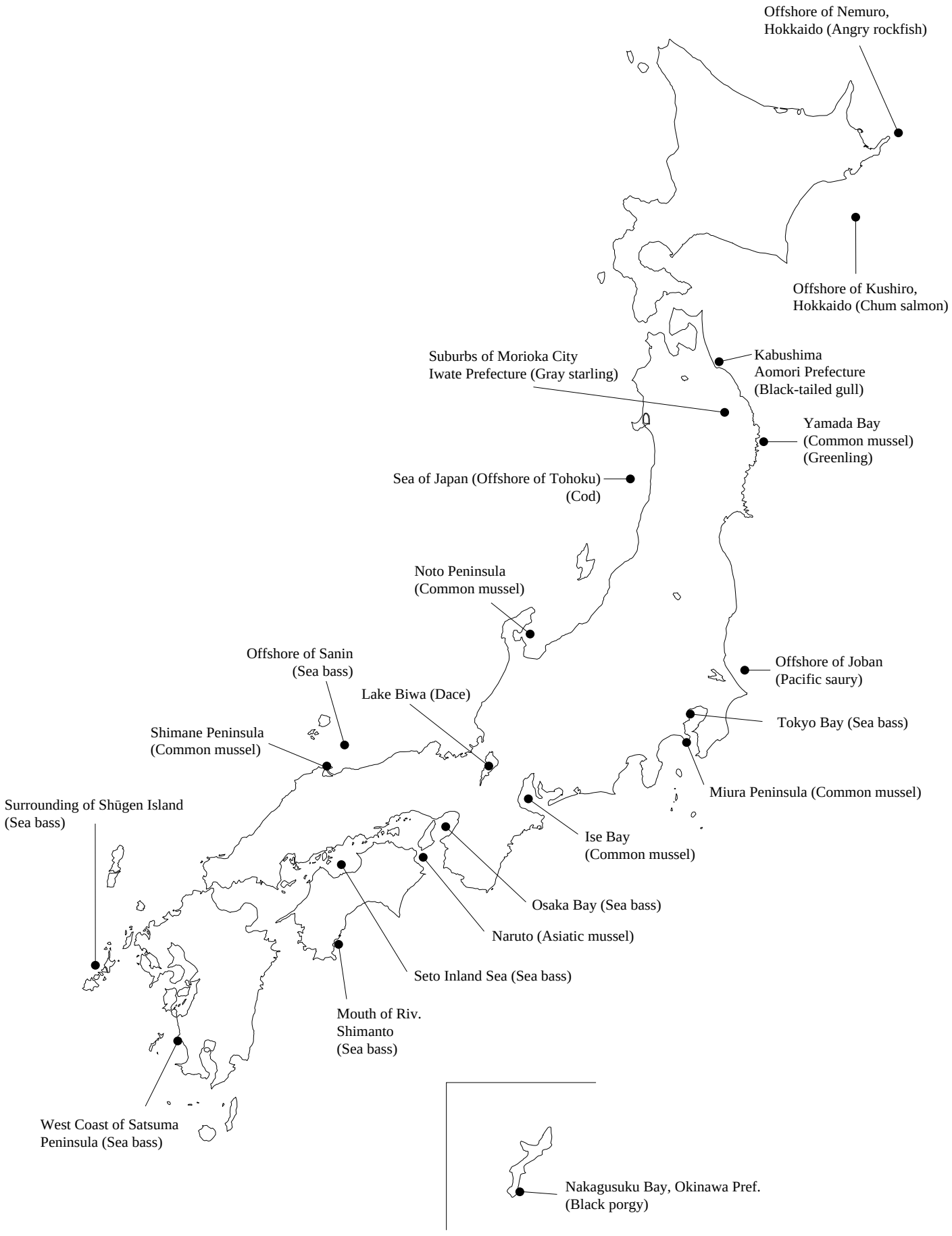

Table 4-1 Characteristics of Species Subject to Wildlife Monitoring

Species	Characteristics of species	Sampling areas	Object of investigation	Notes
Chum salmon (*Oncorhynchus keta*)	1. located in Hokkaido, Kamchatka Peninsula, and North America, etc. 2. hatches in fresh water, grows up in the north seas, returns to fresh water for spawning 3. the bioaccumulation of chemical substances is said to be medium	Offshore of Kushiro in Hokkaido	to grasp the pollution level on a global level	
Angry rockfish (*Sebastes iracundus*)	1. located in the deep seas of northern Japan 2. the bioaccumulation of chemical substances is said to be high	Offshore of Nemuro in Hokkaido	to grasp the pollution level around the Japanese Archipelagos	
Greenling (*Hexagrammos otakii*)	1. located from Hokkaido to southern Japan, the Korean Peninsula, and China 2. lives in shallow seas of 5-50 m	Yamada Bay in Iwate Prefecture	to grasp the pollution level in specific areas	
Pacific saury (*Cololabis saira*)	1. located widely in the northern Pacific Ocean 2. goes around the Japanese Archipelagos; in Chishima in autumn, and offshore Kyushu in winter 3. the bioaccumulation of chemical substances is said to be medium	Pacific Ocean (offshore of Jyoban)	to grasp the pollution level around the Japanese Archipelagos	
Cod (*Gadus macrocephalus*)	1. located in Shimane in the Japan Sea, and north of Aomori in the Pacific Ocean 2. lives in a depth of about 150 m in the southernmost areas	Northerneast offshore in the Sea of Japan	to grasp the pollution level of specific areas	
Sea bass (*Lateolabrax japonicus*)	1. located around the shores of various areas in Japan, the Korean Peninsula, and China 2. in its growing process, sometimes comes to fresh water or mixed water of sea and fresh water. 3. the bioaccumulation of chemical substances is said to be high.	Tokyo Bay, Osaka Bay, Seto Inland Sea, Offshore of Sanin, Mouth of the River Shimanto, West Coast of Satsuma Peninsula, Surrounding of Shûgen Island.	to grasp the pollution level in specific areas	7 areas with differing levels of pollution were investigated

Table 4-1 Characteristics of Species Subject to Wildlife Monitoring (Cont'd)

Species	Characteristics of species	Sampling areas	Object of investigation	Notes
Black porgy (*Acanthopagrus sivicolus*)	1. located in the Nansei Islands 2. lives in coral reef seas and inside bays where rivers flow in	Nakagusuku Bay in Okinawa Prefecture	to grasp the pollution level in specific areas	
Dace (*Tribolodon hakonensis*)	1. located widely in the fresh water of Japan 2. predator of mostly insects	Lake Biwa	to grasp the pollution level in specific areas	
Common mussel (*Mytilus edulis*)	1. located world wide, excluding tropical zones 2. sticks on the rocks of inner bays and bridge piers	Miura Peninsula in Kanagawa Prefecture, Yamada Bay in Iwate Prefecture, Noto Peninsula in Ishikawa Prefecture, Ise Bay (Nagoya Port), Coast of Shimane Peninsula	to grasp the pollution level in specific areas	5 areas with differing pollution levels were investigated
Asiatic mussel (*Mytilus coruscus*)	1. located in various areas south of southern Hokkaido 2. sticks on rocks where the current is fast (1-10 m/s)	near Naruto Channels	to grasp the pollution level in specific areas	
Gray starling (*Strunus cineraceus*)	1. located widely in the far east, the affinity located world wide 2. staple food are insects	Suburbs of Morioka City in Iwate Prefecture	to grasp the pollution level in specific areas	
Black-tailed gull (*Larus crassirostris*)	1. breeds mainly in the sea off Japan 2. breeds in a group at a shore reef and a field of grass etc. or the island in the coast	Kabushima in Aomori Prefecture	to grasp the pollution level around the Japanese Archipelagos	

Table 4-2 Results of Wildlife Monitoring (Fiscal Year 1995)

(Unit : ppm)

Substance		Fishes		Shellfishes		Birds		Total	
		Detected freq.	Detection range	Detected freq.	Detection range	Detected freq.	Detection range	Detected freq.	Detection range
PCBs	PCB	34	0.01 ～ 0.24	15	0.01 ～ 0.11	5	0.14 ～ 0.67	54	0.01 ～ 0.67
	HCB	9	0.001	0	－	6	0.001～ 0.012	15	0.001～ 0.012
Drins	Dieldrin	10	0.001～ 0.003	5	0.08 ～ 0.17	5	0.002～ 0.01	20	0.001～ 0.17
DDTs	o, p'– DDT	15	0.001～ 0.014	0	－	0	－	15	0.001～ 0.014
	p, p'– DDT	33	0.001～ 0.044	5	0.02 ～ 0.024	1	0.001	39	0.001～ 0.044
	o, p'– DDE	10	0.001～ 0.019	0	－	0	－	10	0.001～ 0.019
	p, p'– DDE	63	0.001～ 0.02	15	0.001～ 0.008	10	0.051～ 0.7	88	0.001～ 0.7
	o, p'– DDD	5	0.001～ 0.002	0	－	0	－	5	0.001～ 0.002
	p, p'– DDD	31	0.001～ 0.014	5	0.008～ 0.009	4	0.001～ 0.002	40	0.001～ 0.014
Chlordanes	trans–Chlordane	14	0.001～ 0.005	20	0.002～ 0.008	0	－	34	0.001～ 0.008
	cis–Chlordane	33	0.001～ 0.008	20	0.002～ 0.041	0	－	53	0.001～ 0.041
	trans–Nonachlor	50	0.001～ 0.015	20	0.002～ 0.005	5	0.007～ 0.022	75	0.001～ 0.022
	cis–Nonachlor	27	0.001～ 0.008	10	0.001	4	0.001～ 0.003	41	0.001～ 0.008
	Oxychlordane	3	0.001～ 0.002	5	0.005～ 0.007	5	0.003～ 0.011	13	0.001～ 0.011
	Total–Chlordanes	53	0.001～ 0.029	20	0.006～ 0.061	5	0.012～ 0.036	78	0.001～ 0.061
HCHs	α –HCH	8	0.001～ 0.002	0	－	2	0.002～ 0.003	10	0.001～ 0.003
	β –HCH	10	0.002～ 0.007	0	－	10	0.003～ 0.011	20	0.002～ 0.011
	γ –HCH	0	－	0	－	0	－	0	－
Phthalates Phosphates	Dibutyl phthalate	0	－	2	0.1	0	－	2	0.1
	Bis(2-ethylhexyl) phthalate	0	－	4	0.1	0	－	4	0.1
	Tributyl phosphate	0	－	1	0.01	0	－	1	0.01
Total samples		70		30		10		110	

See Chapter 6 on organotin compounds.

Survey results for 2 substances of phthalates are reported in fiscal year 1993〔The number of samples in fiscal year 1993 is 70 for fishes, 30 for shellfishes and 10 for birds (however only 5 for bis (2-ethylhexyl) phthalate).〕.

Survey results for tributyl phosphate are reported in fiscal year 1991 (The number of samples in fiscal year 1991 is 65 for fishes, 30 for shellfishes and 10 for birds.) .